



## Complete Summary

---

### GUIDELINE TITLE

ACC/AHA guidelines for the evaluation and management of chronic heart failure in the adult: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1995 Guidelines for the Evaluation and Management of Heart Failure).

### BIBLIOGRAPHIC SOURCE(S)

Hunt SA, Baker DW, Chin MH, Cinquegrani MP, Feldman AM, Francis GS, Ganiats TG, Goldstein S, Gregoratos G, Jessup ML, Noble RJ, Packer M, Silver MA, Stevenson LW. ACC/AHA guidelines for the evaluation and management of chronic heart failure in the adult. Bethesda (MD): American College of Cardiology Foundation (ACCF); 2001 Sep. 56 p. [573 references]

## COMPLETE SUMMARY CONTENT

SCOPE

METHODOLOGY - including Rating Scheme and Cost Analysis

RECOMMENDATIONS

EVIDENCE SUPPORTING THE RECOMMENDATIONS

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

QUALIFYING STATEMENTS

IMPLEMENTATION OF THE GUIDELINE

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT

CATEGORIES

IDENTIFYING INFORMATION AND AVAILABILITY

## SCOPE

### DISEASE/CONDITION(S)

Chronic heart failure in adults with left ventricular systolic and diastolic dysfunction.

Note: This guideline specifically excludes recommendations for treatment of acute heart failure, heart failure in children, heart failure due to primary valvular disease or congenital malformations, as well as recommendations for treatment of specific myocardial disorders.

### GUIDELINE CATEGORY

Diagnosis  
Evaluation

Prevention  
Treatment

#### CLINICAL SPECIALTY

Cardiology  
Family Practice  
Geriatrics  
Internal Medicine

#### INTENDED USERS

Physicians

#### GUIDELINE OBJECTIVE(S)

To assist physicians in clinical decision-making by describing a range of generally acceptable approaches for the prevention, diagnosis, and management of heart failure

#### TARGET POPULATION

Adults with chronic heart failure due to left ventricular systolic and diastolic dysfunction and adults at high risk of developing heart failure

#### INTERVENTIONS AND PRACTICES CONSIDERED

##### Assessments

1. Thorough history and physical examination
2. Two-dimensional echocardiogram coupled with Doppler flow studies
3. Radionuclide ventriculography
4. Magnetic resonance imaging or computed tomography
5. Chest radiography
6. 12-lead electrocardiography
7. Measurement of brain natriuretic peptide (BNP) levels
8. Laboratory testing: complete blood count, urinalysis, serum electrolytes (including calcium and magnesium), and blood lipids as well as testing of both renal and hepatic function. Additional tests include thyroid function, serum ferritin, transferrin saturation, heart/liver biopsy, and human immunodeficiency virus screening
9. Cardiac catheterization with coronary arteriography
10. Assessment of functional capacity with New York Heart Association classification and exercise tolerance testing

##### Therapy

1. Angiotensin converting enzyme (ACE) inhibitors, such as captopril, enalapril, fosinopril, lisinopril, quinapril, and ramipril
2. Beta-adrenergic blockers, such as bisoprolol, carvedilol, metoprolol tartrate, metoprolol succinate extended release

3. Valve replacement or repair surgery in patients with significant valvular stenosis or regurgitation
4. Diuretics (loop and thiazides) (note: loop diuretics, such as bumetanide, furosemide, and torsemide, are the preferred diuretics in heart failure patients)
5. Digitalis glycosides, such as digoxin
6. Aldosterone antagonists, such as spironolactone
7. Angiotensin receptor blockers, such as candesartan, eprosartan, irbesartan, losartan, telmisartan, and valsartan
8. Hydralazine and isosorbide dinitrate
9. Exercise training

Note from the National Guideline Clearinghouse: many other interventions, or combination of interventions, are considered in the full-text guideline.

## MAJOR OUTCOMES CONSIDERED

- Sensitivity and specificity of diagnostic instruments
- Morbidity and mortality due to heart failure
- Symptoms of heart failure
- Cardiovascular events
- Risk of heart failure
- Risk of death and hospitalization
- Survival rates
- Quality of life and sense of well-being
- Adverse effects

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)  
 Hand-searches of Published Literature (Secondary Sources)  
 Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Pertinent medical literature in the English language was identified through a series of computerized literature searches (including Medline and EMBASE) and a manual search of selected articles.

### NUMBER OF SOURCE DOCUMENTS

Not stated

### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

## RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

### Levels of evidence

- A. Data were derived from multiple randomized clinical trials
- B. Data were derived from a single randomized trial or non-randomized studies
- C. Consensus opinion of experts was the primary source of recommendations

## METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses  
Systematic Review

## DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

## METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

## DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Experts in the subject under consideration are selected from the American College of Cardiology and the American Heart Association to examine subject-specific data and write guidelines. The process includes additional representatives from other medical specialty groups when appropriate. Writing groups are specifically charged to perform a formal literature review, weigh the strength of evidence for or against a particular treatment or procedure, and include estimates of expected health outcomes where data exist. Patient-specific modifiers, comorbidities, and issues of patient preference that might influence the choice of particular tests or therapies are considered as well as frequency of follow-up and cost-effectiveness.

## RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Class I: Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective.

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/ efficacy of a procedure or treatment.

Class IIa: The weight of evidence or opinion is in favor of the procedure or treatment.

Class IIb: Usefulness/efficacy is less well established by evidence or opinion.

Class III: Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful.

## COST ANALYSIS

Observational studies and randomized controlled trials have shown that disease-management programs can reduce the frequency of hospitalization and can improve quality of life and functional status. Patients at high risk for clinical deterioration or hospitalization are likely to benefit from disease-management programs and represent those for whom such interventions are most likely to be cost-effective. The largest successful randomized controlled trial of disease management targeted elderly patients who had been hospitalized for HF, had a prior history of HF, had 4 or more hospitalizations within 5 years, or had an HF exacerbation caused by an acute myocardial infarction or uncontrolled hypertension. Patients randomized to the disease-management program had significantly fewer hospitalizations and a reduced cost of care compared with patients in the control group. However, it is not clear which elements of disease-management programs are crucial for success. In addition, it is not known whether such interventions are feasible in settings with limited resources and personnel and among diverse patient populations.

## METHOD OF GUIDELINE VALIDATION

External Peer Review  
Internal Peer Review

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The document was reviewed by three official reviewers nominated by American College of Cardiology, three official reviewers nominated by American Heart Association, one reviewer nominated by the Heart Failure Society of America, one reviewer nominated by the International Society for Heart and Lung Transplantation, one reviewer nominated from the American Academy of Family Physicians, one reviewer nominated by the National Heart Foundation of Australia, the American College of Cardiology Hypertensive Disease Committee, and sixteen content reviewers.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

Definitions for the weight of the evidence (A-C) and classes of recommendations (I-III) can be found at the end of the Major Recommendations field.

#### Assessment of Patients

#### Recommendations for the Evaluation of Patients with Heart Failure

##### Class I

1. Thorough history and physical examination to identify cardiac and noncardiac disorders that might lead to the development of heart failure or accelerate the progression of heart failure. (Level of evidence: C)

2. Initial and ongoing assessment of patient's ability to perform routine and desired activities of daily living (Level of Evidence: C)
3. Initial and ongoing assessment of volume status. (Level of Evidence: C)
4. Initial measurement of complete blood count, urinalysis, serum electrolytes (including calcium and magnesium), blood urea nitrogen, serum creatinine, blood glucose, liver function tests, and thyroid-stimulating hormone. (Level of Evidence: C)
5. Serial monitoring of serum electrolytes and renal function. (Level of Evidence: C)
6. Initial 12-lead electrocardiogram and chest radiograph. (Level of Evidence: C)
7. Initial 2-dimensional echocardiography with Doppler or radionuclide ventriculography to assess left ventricular systolic function. (Level of Evidence: C)
8. Cardiac catheterization with coronary arteriography in patients with angina who are candidates for revascularization. (Level of Evidence: B)

#### Class IIa

1. Cardiac catheterization with coronary arteriography in patients with chest pain who have not had evaluation of their coronary anatomy and who have no contraindications to coronary revascularization. (Level of Evidence: C)
2. Cardiac catheterization with coronary arteriography in patients with known or suspected coronary artery disease but without angina who are candidates for revascularization. (Level of Evidence: C)
3. Noninvasive imaging to detect ischemia and viability in patients with known coronary artery disease and no angina who are being considered for revascularization. (Level of Evidence: C)
4. Maximal exercise testing with measurement of respiratory gas exchange and/or blood oxygen saturation to help determine whether heart failure is the cause of exercise limitation when the contribution of heart failure is uncertain. (Level of Evidence: C)
5. Maximal exercise testing with measurement of respiratory gas exchange to identify high-risk patients who are candidates for cardiac transplantation or other advanced treatments. (Level of Evidence: B)
6. Echocardiography in asymptomatic first-degree relatives of patients with idiopathic dilated cardiomyopathy. (Level of Evidence: C)
7. Repeat measurement of ejection fraction in patients who have had a change in clinical status or who have experienced or recovered from a clinical event or received treatment that might have had a significant effect on cardiac function. (Level of Evidence: C)
8. Screening for hemochromatosis. (Level of Evidence: C)
9. Measurement of serum antinuclear antibody, rheumatoid factor, urinary vanillylmandelic acid, and metanephrines in selected patients. (Level of Evidence: C)

#### Class IIb

1. Noninvasive imaging to define the likelihood of coronary artery disease in patients with left ventricular dysfunction. (Level of Evidence: C)
2. Maximal exercise testing with measurement of respiratory gas exchange to facilitate prescription of an appropriate exercise program. (Level of Evidence: C)

3. Endomyocardial biopsy in patients in whom an inflammatory or infiltrative disorder of the heart is suspected. (Level of Evidence: C)
4. Assessment of human immunodeficiency virus status. (Level of Evidence: C)

#### Class III

1. Endomyocardial biopsy in the routine evaluation of patients with heart failure. (Level of Evidence: C)
2. Routine Holter monitoring or signal-averaged electrocardiography. (Level of Evidence: C)
3. Repeat coronary arteriography or noninvasive testing for ischemia in patients for whom coronary artery disease has previously been excluded as the cause of left ventricular dysfunction. (Level of Evidence: C)
4. Routine measurement of circulating levels of norepinephrine or endothelin. (Level of Evidence: C)

#### Therapy

#### Recommendations for Patients at High Risk of Developing Heart Failure (Stage A)

#### Class I

1. Control of systolic and diastolic hypertension in accordance with recommended guidelines. (Level of Evidence: A)
2. Treatment of lipid disorders, in accordance with recommended guidelines. (Level of Evidence: B)
3. Avoidance of patient behaviors that may increase the risk of heart failure (e.g., smoking, alcohol consumption, and illicit drug use). (Level of Evidence: C)
4. Angiotensin converting enzyme (ACE) inhibition in patients with a history of atherosclerotic vascular disease, diabetes mellitus, or hypertension and associated cardiovascular risk factors. (Level of Evidence: B)
5. Control of ventricular rate in patients with supraventricular tachyarrhythmias. (Level of Evidence: B)
6. Treatment of thyroid disorders. (Level of Evidence: C)
7. Periodic evaluation for signs and symptoms of heart failure. (Level of Evidence: C)

#### Class IIa

Noninvasive evaluation of left ventricular function in patients with a strong family history of cardiomyopathy or in those receiving cardiotoxic interventions. (Level of Evidence: C)

#### Class III

1. Exercise to prevent the development of heart failure. (Level of Evidence: C)
2. Reduction of dietary salt beyond that which is prudent for healthy individuals in patients without hypertension or fluid retention. (Level of Evidence: C)

3. Routine testing to detect left ventricular dysfunction in patients without signs or symptoms of heart failure or evidence of structural heart disease. (Level of Evidence: C)
4. Routine use of nutritional supplements to prevent the development of structural heart disease. (Level of Evidence: C)

### Recommendations for Patients with Asymptomatic Left Ventricular Systolic Dysfunction (Stage B)

#### Class I

1. Angiotensin converting enzyme inhibition in patients with a recent or remote history of myocardial infarction regardless of ejection fraction. (Level of Evidence: A)
2. Angiotensin converting enzyme inhibition in patients with a reduced ejection fraction, whether or not they have experienced a myocardial infarction. (Level of Evidence: B)
3. Beta-blockade in patients with a recent myocardial infarction regardless of ejection fraction. (Level of Evidence: A)
4. Beta-blockade in patients with a reduced ejection fraction, whether or not they have experienced a myocardial infarction. (Level of Evidence: B)
5. Valve replacement or repair for patients with hemodynamically significant valvular stenosis or regurgitation. (Level of Evidence: B)
6. Regular evaluation for signs and symptoms of heart failure. (Level of Evidence: C)
7. Measures listed as class I recommendations for patients in stage A. (Levels of Evidence: A, B, and C as appropriate).

#### Class IIb

Long-term treatment with systemic vasodilators in patients with severe aortic regurgitation. (Level of Evidence: B)

#### Class III

1. Treatment with digoxin in patients with left ventricular dysfunction who are in sinus rhythm. (Level of Evidence: C)
2. Reduction of dietary salt beyond that which is prudent for healthy individuals in patients without hypertension or fluid retention. (Level of Evidence: C)
3. Exercise to prevent the development of heart failure. (Level of Evidence: C)
4. Routine use of nutritional supplements to treat structural heart disease or prevent the development of symptoms of heart failure. (Level of Evidence: C)

### Recommendations for Treatment of Symptomatic Left Ventricular Systolic Dysfunction (Stage C)

#### Class I

1. Diuretics in patients who have evidence of fluid retention. (Level of Evidence: A)



2. Angiotensin converting enzyme inhibition in all patients, unless contraindicated. (Level of Evidence: A)
3. Beta-adrenergic blockade in all stable patients, unless contraindicated. Patients should have no or minimal evidence of fluid retention and should not have required treatment recently with an intravenous positive inotropic agent. (Level of Evidence: A).
4. Digitalis for the treatment of symptoms of heart failure, unless contraindicated. (Level of Evidence: A)
5. Withdrawal of drugs known to adversely affect the clinical status of patients (e.g., nonsteroidal anti-inflammatory drugs, most antiarrhythmic drugs, and most calcium channel blocking drugs). (Level of Evidence: B)
6. Measures listed as class I recommendations for patients in stages A and B. (Levels of Evidence: A, B, and C as appropriate).

#### Class IIa

1. Spironolactone in patients with recent or current class IV symptoms, preserved renal function, and a normal potassium concentration. (Level of Evidence: B)
2. Exercise training as an adjunctive approach to improve clinical status in ambulatory patients. (Level of Evidence: A)
3. Angiotensin receptor blockade in patients who are being treated with digitalis, diuretics, and a beta-blocker and who cannot be given an angiotensin converting enzyme inhibitor because of cough or angioedema. (Level of Evidence: A)
4. A combination of hydralazine and a nitrate in patients who are being treated with digitalis, diuretics, and a beta-blocker and who cannot be given an angiotensin converting enzyme inhibitor because of hypotension or renal insufficiency. (Level of Evidence: B)

#### Class IIb

1. Addition of an angiotensin receptor blocker to an angiotensin converting enzyme inhibitor. (Level of Evidence: B)
2. Addition of a nitrate (alone or in combination with hydralazine) to an angiotensin converting enzyme inhibitor in patients who are also being given digitalis, diuretics, and a beta-blocker. (Level of Evidence: B)

#### Class III

1. Long-term intermittent use of an infusion of a positive inotropic drug. (Level of Evidence: C)
2. Use of an angiotensin receptor blocker instead of an angiotensin converting enzyme inhibitor in patients with heart failure who have not been given or who can tolerate an angiotensin converting enzyme inhibitor. (Level of Evidence: B)
3. Use of an angiotensin receptor blocker before a beta-blocker in patients with heart failure who are taking an angiotensin converting enzyme inhibitor. (Level of Evidence: A)
4. Use of a calcium channel blocking drug as a treatment for heart failure. (Level of Evidence: B)

5. Routine use of nutritional supplements (coenzyme Q10, carnitine, taurine, and antioxidants) or hormonal therapies (growth hormone or thyroid hormone) for the treatment of heart failure. (Level of Evidence: C)

#### Recommendations for Patients with Refractory End-Stage Heart Failure (Stage D)

##### Class I

1. Meticulous identification and control of fluid retention. (Level of Evidence: B)
2. Referral for cardiac transplantation in eligible patients. (Level of Evidence: B)
3. Referral to a heart failure program with expertise in the management of refractory heart failure. (Level of Evidence: A)
4. Measures listed as class I recommendations for patients in stages A, B, and C. (Levels of Evidence: A, B, and C as appropriate)

##### Class IIb

1. Pulmonary artery catheter placement to guide therapy in patients with persistently severe symptoms. (Level of Evidence: C)
2. Mitral valve repair or replacement for severe secondary mitral regurgitation. (Level of Evidence: C)
3. Continuous intravenous infusion of a positive inotropic agent for palliation of symptoms. (Level of Evidence: C)

##### Class III

1. Partial left ventriculectomy. (Level of Evidence: C)
2. Routine intermittent infusions of positive inotropic agents. (Level of Evidence: B)

#### Treatment of Special Populations and Concomitant Disorders

#### Recommendations for Management of Concomitant Diseases in Patients with Heart Failure

##### Class I

1. Control of systolic and diastolic hypertension in patients with heart failure in accordance with recommended guidelines. (Level of Evidence: A)
2. Nitrates and beta-blockers (in conjunction with diuretics) for the treatment of angina in patients with heart failure. (Level of Evidence: B)
3. Coronary revascularization in patients who have both heart failure and angina. (Level of Evidence: A)
4. Anticoagulants in patients with heart failure who have paroxysmal or chronic atrial fibrillation or a previous thromboembolic event. (Level of Evidence: A)
5. Control of the ventricular response in patients with heart failure and atrial fibrillation with a beta-blocker (or amiodarone, if the beta-blocker is contraindicated or not tolerated). (Level of Evidence: A)
6. Beta-adrenergic blockade (unless contraindicated) in patients with heart failure to reduce the risk of sudden death. Patients should have no or minimal

- fluid retention and should not have recently required treatment with an intravenous positive inotropic agent. (Level of Evidence: A)
7. Implantable cardioverter-defibrillator (alone or in combination with amiodarone) in patients with heart failure who have a history of sudden death, ventricular fibrillation, or hemodynamically destabilizing ventricular tachycardia. (Level of Evidence: A)

#### Class IIa

1. Antiplatelet agents for prevention of myocardial infarction and death in patients with heart failure who have underlying coronary artery disease. (Level of Evidence: B)
2. Digitalis to control the ventricular response in patients with heart failure and atrial fibrillation. (Level of Evidence: A)

#### Class IIb

1. Coronary revascularization in patients who have heart failure and coronary artery disease but no angina. (Level of Evidence: B)
2. Restoration of sinus rhythm by electrical cardioversion in patients with heart failure and atrial fibrillation. (Levels of Evidence: C)
3. Amiodarone to prevent sudden death in patients with heart failure and asymptomatic ventricular arrhythmias. (Level of Evidence: B)
4. Anticoagulation in patients with heart failure who do not have atrial fibrillation or a previous thromboembolic event. (Level of Evidence: B or C)

#### Class III

1. Routine use of an implantable cardioverter-defibrillator in patients with heart failure. (Level of Evidence: C)
2. Class I or III antiarrhythmic drugs (except amiodarone) in patients with heart failure for the prevention or treatment of asymptomatic ventricular arrhythmias. (Level of Evidence: A)
3. Ambulatory electrocardiographic monitoring for the detection of asymptomatic ventricular arrhythmias. (Level of Evidence: A)

### Diastolic Dysfunction

### Recommendations for Management of Heart Failure and Preserved Systolic Function

#### Class I

1. Control of systolic and diastolic hypertension, in accordance with published guidelines. (Level of Evidence: A)
2. Control of ventricular rate in patients with atrial fibrillation. (Level of Evidence: C)
3. Diuretics to control pulmonary congestion and peripheral edema. (Level of Evidence: C)

#### Class IIa

Coronary revascularization in patients with coronary artery disease in whom symptomatic or demonstrable myocardial ischemia is judged to be having an adverse effect on diastolic function. (Level of Evidence: C)

#### Class IIb

1. Restoration of sinus rhythm in patients with atrial fibrillation. (Level of Evidence: C)
2. Use of beta-adrenergic blocking agents, angiotensin converting enzyme inhibitors, angiotensin receptor blockers, or calcium antagonists in patients with controlled hypertension to minimize symptoms of heart failure. (Level of Evidence: C)
3. Digitalis to minimize symptoms of heart failure. (Level of Evidence: C)

#### End-of-Life Considerations

#### Recommendations for End-of-Life Care

#### Class I

1. Ongoing patient and family education regarding prognosis for function and survival. (Level of Evidence: C)
2. Patient and family education about options for formulating and implementing advance directives. (Level of Evidence: C)
3. Continuity of medical care between inpatient and outpatient settings. (Level of Evidence: C)
4. Components of hospice care that are appropriate to the relief of suffering. (Level of Evidence: C)

#### Class III

Implantation of a cardioverter-defibrillator in patients with class IV symptoms who are not anticipated to experience clinical improvement from available treatments. (Level of Evidence: C)

#### Definitions:

#### Levels of Evidence

- A. Data were derived from multiple randomized clinical trials
- B. Data were derived from a single randomized trial or non-randomized studies
- C. Consensus opinion of experts was the primary source of recommendations

#### Strength of the Recommendations:

#### Class I:

Conditions for which there is evidence and/or general agreement that a given procedure/therapy is useful and effective.

#### Class II:

Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of performing the procedure/therapy.

Class IIa:

Weight of evidence/opinion is in favor of usefulness/efficacy.

Class IIb:

Usefulness/efficacy is less well established by evidence/opinion.

Class III:

Conditions for which there is evidence and/or general agreement that a procedure/therapy is not useful/effective and in some cases may be harmful.

#### CLINICAL ALGORITHM(S)

An algorithm is provided for the stages in the evolution of heart failure and recommended therapy by stage.

### EVIDENCE SUPPORTING THE RECOMMENDATIONS

#### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The level of evidence is given for each recommendation (see the "Major Recommendations" field).

The strength of evidence does not necessarily reflect the strength of a recommendation. A treatment may be considered controversial although it has been evaluated in controlled clinical trials; conversely, a strong recommendation may be based on years of clinical experience and be supported only by historical data or by no data at all.

### BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

#### POTENTIAL BENEFITS

The evolution and progression of heart failure can be appropriately characterized by considering 4 stages of the disease as described in the original guidelines. This staging system recognizes that heart failure, like coronary artery disease, has established risk factors and structural prerequisites; that the evolution of heart failure has asymptomatic and symptomatic phases; and that specific treatments targeted at each stage can reduce the morbidity and mortality of heart failure.

#### POTENTIAL HARMS

Diuretics

The principal adverse effects of diuretics include electrolyte depletion as well as hypotension and azotemia. Diuretics may also cause rashes and hearing difficulties, but these are generally idiosyncratic or are seen with the use of very large doses, respectively. Diuretics can cause the depletion of important cations (potassium and magnesium), which can predispose patients to serious cardiac arrhythmias, particularly in the presence of digitalis therapy. The risk of electrolyte depletion is markedly enhanced when 2 diuretics are used in combination.

### Angiotensin-converting Enzyme (ACE) Inhibitors

- Adverse effects related to angiotensin suppression include hypotension, worsening renal function, and potassium retention.
- Adverse effects related to kinin potentiation include cough and angioedema.
- Other types of side effects may also occur (e.g., rash and taste disturbances).

### Beta-blockers

Initiation of treatment with a beta-blocker can produce 4 types of adverse reactions that require attention and management:

- Fluid retention and worsening heart failure
- Fatigue
- Bradycardia and heart block
- Hypotension

### Digitalis Glycosides

- The major side effects of digitalis include cardiac arrhythmias (e.g., ectopic and re-entrant cardiac rhythms and heart block), gastrointestinal symptoms (e.g., anorexia, nausea, and vomiting), and neurological complaints (e.g., visual disturbances, disorientation, and confusion). Digitalis toxicity is commonly associated with serum digoxin levels more than 2 ng per mL but may occur with lower digoxin levels, especially if hypokalemia, hypomagnesemia, or hypothyroidism co-exist.
- There is concern that levels of digoxin that are generally considered to be in the therapeutic range (0.7 to 2 ng per mL) may exert deleterious effects in the long term, even though such levels appear to be well tolerated in the short-term. In one major long-term trial, serum digoxin concentrations in the therapeutic range were associated with an increased frequency of hospitalizations for cardiovascular events other than heart failure and an increased risk for death due to arrhythmias or myocardial infarction.

### Aldosterone Antagonists (Spironolactone)

Spironolactone can cause hyperkalemia and gynecomastia (in men).

### Angiotensin Receptor Blockers

Angiotensin receptor blockers can cause hypotension, worsening renal function, and hyperkalemia.

## Other Drugs

Hydralazine and isosorbide dinitrate produce frequent adverse reactions (primarily headache and gastrointestinal complaints).

Subgroup Most Likely to be Harmed:

### Angiotensin-converting Enzyme (ACE) Inhibitors

- The frequency of cough is approximately 5% to 10% in white patients of European descent and rises to nearly 50% in Chinese patients.
- Angioedema occurs in fewer than 1% of patients taking an angiotensin converting enzyme inhibitor but is more frequent in blacks.

### Beta-blockers

Patients with fluid retention before treatment are at greatest risk of fluid retention during treatment.

### Digitalis Glycosides

- The concomitant use of quinidine, verapamil, spironolactone, flecainide, propafenone, or amiodarone can increase serum digoxin levels and may increase the likelihood of digitalis toxicity.
- A low lean body mass and impaired renal function can elevate serum digoxin levels, which may explain the increased risk of digitalis toxicity in elderly patients.

### Patients with Refractory End stage Heart Failure

Patients who are at the end stage of their disease are at particular risk of developing hypotension and renal insufficiency after the administration of an angiotensin converting enzyme inhibitor and of experiencing worsening heart failure after treatment with a beta-blocker.

## QUALIFYING STATEMENTS

### QUALIFYING STATEMENTS

1. These practice guidelines are intended to assist physicians in clinical decision making by describing a range of generally acceptable approaches for the diagnosis, management, or prevention of specific diseases or conditions. These guidelines attempt to define practices that meet the needs of most patients in most circumstances. The ultimate judgment regarding care of a particular patient must be made by the physician and patient in light of all of the circumstances presented by that patient.
2. The guidelines attempt to define practices that meet the needs of most patients under most circumstances. However, the ultimate judgment regarding the care of a particular patient must be made by the physician in light of all of the circumstances that are relevant to that patient. The various

therapeutic strategies described in this document can be viewed as a checklist to be considered for each patient in an attempt to individualize treatment for an evolving disease process. Every patient is unique, not only in terms of his or her cause and course of heart failure, but also in terms of his or her personal and cultural approach to the disease. Guidelines can only provide an outline for evidence-based decisions or recommendations for individual care; these guidelines are meant to provide that outline.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

#### Recommendations for Implementing Practice Guidelines

##### Class I

1. Multifactorial interventions that attack different barriers to behavioral change. (Level of Evidence: A)
2. Multidisciplinary disease-management programs for patients at high risk for hospital admission or clinical deterioration. (Level of Evidence: B)
3. Academic detailing or educational outreach visits. (Level of Evidence: A)

##### Class IIa

1. Chart audit and feedback of results. (Level of Evidence: A)
2. Reminder systems. (Level of Evidence: A)
3. Local opinion leaders. (Level of Evidence: A)

##### Class IIb

Multidisciplinary disease management programs for patients at low risk for hospital admission or clinical deterioration. (Level of Evidence: B)

##### Class III

1. Dissemination of guidelines without more intensive behavioral change efforts. (Level of Evidence: A)
2. Basic provider education alone. (Level of Evidence: A)

Note: Definitions for the weight of the evidence (A-C) and classes of recommendations (I-III) can be found at the end of the "Major Recommendations" field.

### RELATED NQMC MEASURES

- [Heart failure: percent of patients discharged home with written discharge instructions or educational material.](#)
- [Heart failure: percent of patients with documentation that left ventricular function was assessed before arrival, during hospitalization, or is planned for after discharge.](#)



- [Heart failure: percent of patients who are prescribed an angiotensin converting enzyme inhibitor \(ACEI\) at hospital discharge.](#)
- [Heart failure: percent of patients with a history of smoking cigarettes who are given smoking cessation advice or counseling during hospital stay.](#)

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

End of Life Care  
Living with Illness

### IOM DOMAIN

Effectiveness  
Patient-centeredness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Hunt SA, Baker DW, Chin MH, Cinquegrani MP, Feldman AM, Francis GS, Ganiats TG, Goldstein S, Gregoratos G, Jessup ML, Noble RJ, Packer M, Silver MA, Stevenson LW. ACC/AHA guidelines for the evaluation and management of chronic heart failure in the adult. Bethesda (MD): American College of Cardiology Foundation (ACCF); 2001 Sep. 56 p. [573 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

### DATE RELEASED

1995 Nov 1 (revised 2001 Dec)

### GUIDELINE DEVELOPER(S)

American College of Cardiology Foundation - Medical Specialty Society  
American Heart Association - Professional Association

### SOURCE(S) OF FUNDING

The American College of Cardiology Foundation and the American Heart Association. No outside funding accepted.

### GUIDELINE COMMITTEE

## Committee to Revise the 1995 Guidelines for the Evaluation and Management of Heart Failure

### COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Committee Members: Sharon A. Hunt, MD, FACC, Chair; David W. Baker, MD, MPH, FACP; Marshall H. Chin, MD, MPH; Michael P. Cinquegrani, MD, FACC; Arthur M. Feldman, MD, PhD, FACC; Gary S. Francis, MD, FACC; Theodore G. Ganiats, MD; Sidney Goldstein, MD, FACC; Gabriel Gregoratos, MD, FACC; Mariell L. Jessup, MD, FACC; R. Joseph Noble, MD, FACC; Milton Packer, MD, FACC; Marc A. Silver, MD, FACC, FACP, FCCP, FCGC; Lynne Warner Stevenson, MD, FACC

Task Force Members: Raymond J. Gibbons, MD, FACC, Chair; Elliott M. Antman, MD, FACC, Vice Chair; Joseph S. Alpert, MD, FACC; David P. Faxon, MD, FACC; Valentin Fuster, MD, PhD, FACC; Gabriel Gregoratos, MD, FACC; Alice K. Jacobs, MD, FACC; Loren F. Hiratzka, MD, FACC; Richard O. Russell, MD, FACC\*; Sidney C. Smith, Jr, MD, FACC

\*Former Task Force member during this writing effort.

### FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The American College of Cardiology/American Heart Association (ACC/AHA) Task Force on Practice Guidelines makes every effort to avoid any actual or potential conflicts of interest that might arise as a result of an outside relationship or personal interest of a member of the writing panel. Specifically, all members of the writing panel are asked to provide disclosure statements of all such relationships that might be perceived as real or potential conflicts of interest. These statements are reviewed by the parent task force, reported orally to all members of the writing panel at the first meeting, and updated yearly and as change occur.

### ENDORSER(S)

Heart Failure Society of America, Inc - Disease Specific Society  
International Society for Heart and Lung Transplantation

### GUIDELINE STATUS

This is the current release of the guideline. This guideline revises a previously issued version (Guidelines for the evaluation and management of heart failure: report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol 1995 Nov 1;26[5]:1376-98).

These guidelines will be reviewed annually after publication and considered current unless the American College of Cardiology/American Heart Association Task Force on Practice Guidelines revises or withdraws them from circulation.

### GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American College of Cardiology \(ACC\) Web site](#). Also available from the [American Heart Association \(AHA\) Web site](#).

Print copies: Available from Educational Services, American College of Cardiology, 9111 Old Georgetown Road, Bethesda, Maryland 20814-1699 and from the American Heart Association, Office of Scientific Affairs, 7272 Greenville Avenue, Dallas, TX 75231-4596.

#### AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACC/AHA guidelines for the evaluation and management of chronic heart failure in the adult: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to revise the 1995 Guidelines for the Evaluation and Management of Heart Failure). (1) J Am Coll Cardiol. 2001 Dec;38(7):2101-13; (2) Circulation. 2001 Dec 11;104(24):2996-3007; (3) J Heart Lung Transplant 2002 Feb;21(2):189-203.

Electronic copies: Available in Portable Document Format (PDF) from the [American College of Cardiology \(ACC\) Web site](#).

Also available:

- ACC/AHA pocket guidelines for evaluation and management of chronic heart failure in the adult.

Electronic copies available from the ACC Web site: a [Pocket Guideline](#); or [Pocket Guideline Palm Download](#) are available.

Print copies: Available from ACC, Resource Center, 9111 Old Georgetown Rd, Bethesda, MD 20814-1699; (800) 253-4636 (US only). Also available from AHA, Public Information, 7272 Greenville Ave, Dallas TX 75231-4596.

#### PATIENT RESOURCES

None available

#### NGC STATUS

This summary was completed by ECRI on June 30, 1998. The information was verified by the guideline developer on December 1, 1998. This NGC summary was updated on February 25, 2002. The updated information was verified by the guideline developer as of April 17, 2002.

#### COPYRIGHT STATEMENT

This NGC summary is based on the original guideline, which is subject to the guideline developer's copyright restrictions as follows:

Copyright to the original guideline is owned by the American College of Cardiology Foundation (ACCF) and the American Heart Association (AHA). NGC users are free to download a single copy for personal use. Reproduction without permission of the ACC/AHA guidelines is prohibited. Permissions requests should be directed to Tori Pharr at the ACC, 9111 Old Georgetown Rd, Bethesda, MD 20814-1699; telephone, (301) 493-2364; fax, (301) 897-9745.

© 1998-2004 National Guideline Clearinghouse

Date Modified: 11/15/2004

**FIRSTGOV**

